United States General Accounting Office

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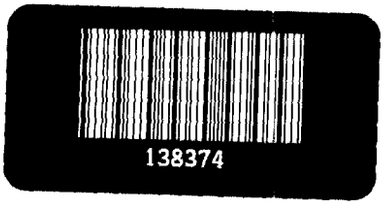
Briefing Report to the Chairman, Subcommittee on Defense, Committee on Appropriations, House of Representatives

March 1989

BATTLEFIELD AUTOMATION

Field Artillery Data Systems Acquisition Problems and Budget Impacts



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National Security and
International Affairs Division

B-228648

March 28, 1989

The Honorable John P. Murtha
Chairman, Subcommittee on Defense
Committee on Appropriations
House of Representatives

Dear Mr. Chairman:

As requested by the former Chairman, we are providing information on the status of the Army's and the Marine Corps' fire support command and control automation programs and plans. This letter summarizes the results of our review which are more fully described in the appendixes.

In the early 1980s, the Army provided an automated artillery command and control system called the Tactical Fire Direction System (TACFIRE) to most heavy divisions and one light division. Because it was large, heavy, and becoming technically obsolete, the Army stopped buying it and began to develop a new system with improved mobility and capability called the Advanced Field Artillery Tactical Data System (AFATDS) for both light and heavy divisions.

AFATDS will not be available to light divisions for several years since the Army plans to field it to heavy divisions first. To meet the current need for automated fire support in those light divisions, the Army is buying an improved TACFIRE system called Light TACFIRE.

In addition, the Army has and is continuing to develop, field, and upgrade other fire support command and control subsystems for both heavy and light divisions. The Army will retain the subsystems when AFATDS is fielded. They include the Fire Support Team/Digital Message Device (FIST/DMD), Battery Computer System, and two forward entry devices--the Digital Communications Terminal and the Hand-held Terminal Unit.

The Marine Corps was developing its own fire support system; however, after significant program delays and cost overruns, the program was canceled and the Marines are evaluating Army programs as potential replacements. For fire support command and control subsystems, the Marines fielded the same battery

computer system as the Army. The Marines developed and in 1989 are fielding the Digital Communications Terminal. As indicated earlier, this terminal is one of the hand-held forward entry devices the Army plans to field.

Our review showed that:

-- The AFATDS program has experienced problems that delayed the completion of the Concept Evaluation Phase by over 2 years. AFATDS, including program office support, has cost the Army $103 million in development, of which $21 million was for extended in-house office support as a result of program delays. The contractor, Magnavox, and the Army believe that corrective actions which have been taken should reduce the risk of further delays in the Concept Evaluation Phase.

-- The Army's plan to start fielding AFATDS in late 1992 may be optimistic in view of the amount of additional software to be developed and the delays experienced during development of software for the Concept Evaluation Phase. Also, there are risks associated with the planned transfer of Concept Evaluation Phase software to the computer hardware to be used for fielding AFATDS. The Army believes that the lessons learned in the Concept Evaluation Phase will reduce the risks of schedule slippages for the remaining software development effort. To further reduce the risks of not completing full-scale development on schedule, the Army wants to begin preliminary work on this phase immediately following the concept evaluation test, rather than waiting several months until the Army, the Office of the Secretary of Defense, and the Congress have completed a scheduled review of the Concept Evaluation Phase.

-- The Army has complied with both the congressional direction to field Light TACFIRE and the congressional cost limits for the AFATDS Concept Evaluation Phase contract. However, the AFATDS cost limit has been reached and the contractor has submitted an additional $9 million claim for payment. The contractor claims these costs are not subject to the cost limitation. The Army's decision on this claim is still pending as of January 1989.

The Congress reduced the fiscal year 1989 budget for AFATDS and related hand-held data entry equipment development and procurement by $72.9 million. It concluded that there was no need to fully fund these programs due to actual and expected delays in the Army's fire support development efforts.

As requested, we did not obtain agency comments on this report. However, we discussed its contents with officials from the Office of the Secretary of Defense and the Department of the Army and have incorporated their comments where appropriate. They agree that there are cost and schedule risks in fielding AFATDS, but believe that management and personnel changes should alleviate some of these risks. They also said that beginning preparations for full-scale development a few months earlier than scheduled would reduce risks of delays in the scheduled 1992 completion date. These officials stated that procurement funding for the acquisition of AFATDS hardware before fiscal 1991 is not necessary, and that the Army plans to acquire sufficient production hardware in fiscal year 1991 to establish an initial training base at the Field Artillery School. The need for funds at that time will depend upon the Army's ability to keep AFATDS' development and fielding on schedule.

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Unless you publicly announce its contents earlier, we plan no further distribution of this report until 10 days from the date of the report. At that time we will send copies to interested parties and make copies available to others upon request.

The major contributions to this report are listed in appendix VII.

Sincerely yours,

Thomas J. Brew
Director, Command, Control,
Communications, and
Intelligence Issues

Contents

ABBREVIATIONS

AFATDS	Advanced Field Artillery Tactical Data System
CEP	Concept Evaluation Phase
CHS	common hardware and software
DCT	Digital Communications Terminal
DOD	Department of Defense
FIST/DMD	Fire Support Team/Digital Message Device
HTU	Hand-held Terminal Unit
MIFASS	Marine Integrated Fire and Air Support System
TACFIRE	Tactical Fire Direction System

GAO Advanced Field Artillery Tactical Data System

Chart I.1: AFATDS Program Evolution

- Current fire support command and control systems inadequate.
- Army initiates AFATDS as its advanced automated fire support system.
- Descriptions of AFATDS.

TACFIRE was deployed to most heavy and one light division beginning in the late 1970s. It provided field artillery units with automated target intelligence and analyses, limited fire planning, and tactical fire control. TACFIRE units are located at division, brigade, and battalion fire support elements. TACFIRE's support devices include the remote hand-held data entry device, which are called digital message devices. The digital message device is used at the company level and forward observer positions, and relays target data and fire commands.

Although heavy divisions have TACFIRE for automated command and control, the Army considers the system inadequate because it lacks distributed processing capability, is too large and heavy, is difficult to operate and has limited functional capability. These and other TACFIRE inadequacies were described in detail in the Army's March 1981 Mission Element Needs Statement for an advanced automated artillery command and control system.

The Army initiated the AFATDS program to provide the needed advanced system capabilities. AFATDS will be an automated network designed to perform fire support functions. It is expected to process information transmitted from surveillance sensors and forward observers' hand-held data entry devices. It is designed to rapidly tell commanders the optimum targets to attack and optimum weapons and ammunitions to use, such as field artillery, naval gunfire, and attack helicopters. AFATDS is also expected to offer improved mobility, survivability, trainability, maintainability, interoperability, and the continuity of operations needed to provide timely, effective fire support to the ground forces engaged in battle.

TACFIRE mission performance software was written in a unique software language; AFATDS mission performance software is being written in the Department of Defense (DOD) standard software language, called Ada. Because of the new language and additional capabilities, the AFATDS program is a major software development effort. The systems' hardware will be acquired through the Army's common hardware and software (CHS) program. The CHS program is an Army-wide effort to provide nondevelopmental common computer hardware and operating system software. The operating system software is provided by the computer contractor for internal computer operations and controls. CHS is to provide computers for the Army's major automated command and control systems for its five key battlefield functional areas, which includes AFATDS.

APPENDIX I

GAO Advanced Field Artillery Tactical Data System

Chart I.2: AFATDS Status

- AFATDS is in CEP.
- CEP schedule has slipped over 2 years, with completion now scheduled for April 1989.
- AFATDS has cost the government $103 million, including program office support; and the contractor has incurred costs of an additional $34 million.

The Army awarded Magnavox a contract for the Concept Evaluation Phase (CEP) of AFATDS in May 1984. The contract provided for system design, as well as the development, integration, and testing of software and surrogate hardware. This 33-month effort was to be completed in February 1987, at a project cost of $33.9 million. The contractor was to absorb $10.2 million of those costs and the government the remaining $23.7 million. With subsequent changes, the contract price was increased from $33.9 million to $47.1 million, with the government's share being $36.9 million. Although the contract modifications reduced the CEP scope of work, the CEP's completion has been delayed over 2 years, and is now scheduled for April 1989.

According to Magnavox, the delays were primarily caused by problems with the compiler, the communications modem, and the Ada software. The Army believes the delays may have been compounded by the contractor's (1) temporary loss of about 20 percent of its programmers, (2) the lack of management controls to accurately assess the program's progress, and (3) contracting for more than could be produced within cost and schedule constraints. Magnavox and the Army believe that corrective actions, which included improved management controls and adjusted schedules, should reduce the risk of further CEP delays.

The government's expenditures for AFATDS through fiscal year 1988 have reached $103 million, of which $36.9 million is for the Magnavox CEP contract, and the remaining $66.1 million is for earlier program development and in-house support costs before and during CEP. As agreed in the contract, Magnavox absorbed $10.2 million of the $47.1 million contract price. In addition, Magnavox incurred $24 million in costs above the contract price that the Army states Magnavox will absorb through fiscal year 1988.

As part of the $103 million cost to the government, about $21 million of the $66.1 million early development and in-house support cost was incurred through fiscal year 1988 for in-house support that would not have been incurred had the CEP been completed in February 1987 as originally scheduled. Since the CEP effort is continuing, the government and Magnavox will incur additional delay related costs through the completion of CEP, now scheduled for April 1989.

GAO Advanced Field Artillery Tactical Data System

Chart I.3: Transfer of AFATDS CEP Software to CHS Computer

- Major software modifications normally expected when software is transferred to different computers.
- CEP software to be transferred to a computer having less capability than the computer used for CEP development.
- The CHS software operating system provided with the CHS computer may not meet AFATDS' large, real-time processing requirement.

After CEP is completed, the Army plans to award Magnavox a sole-source contract primarily to transfer AFATDS CEP software to the CHS computer and to develop additional software for AFATDS performance capabilities. According to Army Ada software studies, this type of transfer generally requires significant software modifications. The computer used to develop CEP software was not the CHS computer, and a significant amount of the software may have to be modified to operate efficiently with the CHS computer.

Specifically, the computer used to develop and test CEP software has capabilities that exceed those of the Army's CHS computer. Computers used for software development include three main processors which have a cumulative processing speed of 9 million instructions per second and cumulatively have more than 54 megabytes of random access memory. The CHS computer being purchased for fielding AFATDS has one main processor with a processing speed of 4 million instructions per second and 16 megabytes of random access memory.

Because of the above difference in capability, a Magnavox official stated that additional CHS computers will be needed when fielding the AFATDS software. The Army agrees that CHS multicomputers, rather than the planned single computer, may be needed at some command levels. Adding CHS computers could require increased funding for additional computers, tracked vehicles, shelters, and support personnel. For example, the Army's Field Artillery School officials have stated that the proposed CHS multicomputer configuration appears to exceed the space available in the tracked vehicle to be used for AFATDS. However, the AFATDS project manager believes that the multicomputer configurations will fit within the planned number of tracked vehicles, but the actual system configuration, including the number of computers and vehicles, cannot be precisely determined until the CEP software transfer is completed.

In addition to the AFATDS CEP software which was developed specifically for AFATDS performance applications, the system will have CHS operating system software that comes with CHS hardware for controlling computer operations. The CHS operating system software may cause problems because AFATDS has a large, near real-time, or virtually instantaneous, processing requirement, and the CHS operating system software is not designed for near-real time computer processing. To meet AFATDS' fast, large processing requirement, the CHS operating system software may need to be replaced. Army officials agreed with this conclusion.

GAO Advanced Field Artillery Tactical Data System

Chart I.4: Extensive Software Development Remains

- Not all software will be developed when system is initially fielded.
- Remaining AFATDS software to be developed in phases.

After CEP the Army plans to complete four additional software development efforts, including three phases or blocks of new software, to meet all AFATDS system requirements. Two of these efforts, the CEP software transfer and block I software development, are planned to run concurrently and be completed in early 1991 and mid-1992, respectively. The Army plans to award a sole-source contract to Magnavox to transfer the CEP software to CHS and to develop block I software. The Magnavox contract will have an option for block II development.

The Block I development involves upgrading the CEP software, developing software to support functions deleted from the CEP, increasing weapons support capabilities to all weapons, and increasing the system's processing speed. Block II software, scheduled to be completed in early 1994, is to provide additional capabilities for deep battle operations. AFATDS block III is planned to provide, under a separate contract, the AFATDS final version of software in mid-1996.

The Army plans to initially field AFATDS with only block I software. Block I, which is scheduled to be a 33-month effort, involves considerable software development to provide interfaces and interoperability between AFATDS and other fire support command and control systems such as TACFIRE. Block I software is also to be written to support functions deleted from the CEP software contract. The October 1985 CEP contract modification omitted or deleted 44 percent of the original CEP software requirements. Army officials plan to incorporate some of the omitted CEP functions into AFATDS block I. Also, block I software is to be developed for supporting additional weapon systems and fuses. According to Army officials, CEP software was written to process data for 7 of the 16 weapon systems and 5 of the 54 types of shell fuses. Therefore, software must still be developed for the remaining 9 artillery weapon systems and 49 types of fuses. The software to support the Multiple Launch Rocket System must also be developed.

According to the Army, computer processing time standards have not been set for AFATDS. Until those time standards are set, the software upgrading needed to meet requirements cannot be accurately determined. Both the Army and Magnavox estimate that over 10 percent of the CEP software will have to be rewritten to provide the near real-time processing capability required.

GAO Advanced Field Artillery Tactical Data System

Chart I.5: Acquisition Plans

- There is risk associated with meeting the scheduled mid-1992 AFATDS fielding.
- Uncertainties in software development could result in increased costs.

Fielding AFATDS with block I software is scheduled for the fourth quarter of fiscal year 1992. This schedule depends on completing the CEP software transfer to CHS and block I development within the scheduled 33 months. The schedule appears optimistic considering the significant software development still required, the software modifications required to improve response times, and the normal problems associated with transferring software developed on one computer to a different computer. The Army estimates that the cost of the block I development and the CEP transfer to be $41.7 million.

Previous completion dates have been missed. For example, the Army's original fire support plan provided to the Congress showed CEP completion in 33 months. The CEP effort has since been extended to 59 months. Army officials stated that the lessons learned in the delayed CEP will increase the likelihood that the contractor will complete the software transfer and block I development on schedule.

It is questionable whether the Army's $41.7 million cost estimate for software transfer and block I development will remain valid. The cost increases experienced during CEP and the uncertainties in the software transfer and block I development may increase the cost. CEP contract costs were originally estimated to be $33.9 million, but the contract was reduced in scope and the price was revised to $47.1 million. The contractors share of cost exceeded its $90.2 million share by $24 million by the end of fiscal year 1988. In addition, the Army does not yet know how much software needs to be written and modified for block I but agrees that software development will be significant. Cost estimates for the block II and block III developments were not available as of January 1989.

In view of the above schedule risks and software development uncertainties, the Army plans to begin contracted analysis of the operational requirements for block I to determine how much and what software is needed. It also plans to begin transferring CEP software to the CHS computer immediately after CEP is completed.

GAO Other Automation Efforts

Chart II.1: Light TACFIRE

- The Army is buying Light TACFIRE to upgrade fire support command and control for the light divisions.
- Light TACFIRE deployment planned in late 1989.
- Projected cost to acquire and maintain Light TACFIRE until 1994 is $58.3 million.

The Army is buying Light TACFIREs to provide its light divisions with an automated field artillery command and control capability above the artillery battery level. Light TACFIRE has been fielded to the 9th Infantry Division and is being procured for the light divisions under a sole-source fixed-price contract with Litton Data Systems. Fielding additional Light TACFIRE is scheduled to begin in late 1989. The remaining light divisions are scheduled to be equipped starting in mid-1990 and continuing at a rate of one division every 3 months. The Army's estimated cost to buy and maintain Light TACFIREs until 1994 is $58.3 million. The Army plans to replace the Light TACFIRE with AFATDS after heavy divisions are equipped with AFATDS about the end of 1994.

Litton Data Systems' briefcase terminal is the key element of the system. Menu driven formats and the ability to allow direct data input with a map digitizer by pointing to a map with an "electronic pencil" simplify its use. Light TACFIRE is also significantly smaller than TACFIRE, with all configurations fully mobile in the high-mobility multipurpose wheeled vehicles rather than 5-ton trucks.

APPENDIX II

GAO Other Automation Efforts

Chart II.2: FIST/DMD

- Description of FIST/DMD.
- FIST/DMD will be used in light divisions with Light TACFIRE until AFATDS is fielded.
- Fielding was scheduled for July 1985, but started in September 1988.

The Fire Support Team/Digital Message Device (FIST/DMD) is a modified digital message device with the capability to handle network communications. It provides four channel digital communications for exchanging target information and fire orders. The FIST/DMD development effort began in 1980. The Army awarded a production contract in August 1984 to procure 827 units.

Initially, the FIST/DMD was being procured for heavy division battalion fire support elements and company level units. As an interim capability, the Army will use some FIST/DMDs with the light divisions' Light TACFIRE until the Light TACFIRE is replaced with AFATDS. At that time, the FIST/DMD will be reissued to heavy forces and reserve components.

Although fielding was originally scheduled for July 1985, the Army fielded the FIST/DMD in September 1988. The Army attributed the delay mainly to program restructuring, software problems, and limited memory capacity.

GAO Other Automation Efforts

Chart II.3: Forward Entry Devices

- The Army plans to buy two types of forward entry devices.
- DCTs procured for two light divisions while HTUs will be bought for the remaining forces.

The Army plans to buy two types of forward entry devices, which will be used for TACFIRE, Light TACFIRE as well as AFATDS. The two devices are Digital Communications Terminal (DCT) and the Hand-held Terminal Unit (HTU). Both devices are to be hand held, programmable input/output terminals capable of editing and displaying messages. They are designed to send and receive messages in short digital bursts over standard radios and be used by forward observers and the light divisions' fire support team chiefs.

Using fiscal year 1985 multiyear funds, the Army obligated $5.7 million to buy 270 DCTs to provide early improved capability to the 82nd Airborne and 7th Infantry Divisions, which the Army considers its two highest priority light divisions. In addition, the Army awarded a $1.8 million DCT software support contract in May 1987, which is expected to be completed in March 1989. DCT fielding is scheduled to begin in the second quarter of fiscal year 1989.

The Army expects to buy about 5,600 HTUs through its CHS program to meet the remaining light and all heavy divisions tactical forward entry device needs. Under the first year provisions of the CHS contract, awarded in August 1988, the Army purchased 306 production model HTUs for fire support testing. A $3.2 million effort is underway to procure HTU software.

The Army's HTU schedule shows formal qualification testing starting in the fourth quarter of fiscal year 1989, software development being completed in first quarter of fiscal year 1990, and the first unit being equipped in the third quarter fiscal year 1990.

GAO Other Automation Efforts

Chart II.4: Marine Corps' Fire Support Automation Efforts

- Marine Corps' need for an integrated fire and air support system.
- MIFASS development program initiated to meet that need.
- MIFASS program canceled.
- Marine Corps evaluating potential substitutes.
- Institute for Defense Analyses Assessment.

The Marine Corps requires an automated command and control system that can integrate and coordinate fire support for amphibious assaults and subsequent land operations. This requirement was defined in the Corps' August 1975 publication of the Required Operational Capability for the Marine Integrated Fire and Air Support System (MIFASS).

To meet that need the Marine Corps, in February 1977, approved full-scale development of MIFASS. The conceptual design phase began in August 1978 with contract awards to Hughes Aircraft and Norden Systems. After completion of this phase, Norden was awarded a 3-year $44 million cost-plus-incentive-fee contract for the design and fabrication of an engineering development model.

According to the Marine Corps, Norden underestimated the program's difficulty and cost and in 1981, increased its estimate to a 4-year effort costing $110 million. The Marine Corps provided the contractor relief by deleting or deferring more than half of the original software requirements, but the schedule again slipped to over 7 years and the cost increased to $146 million. In July 1987, after spending about $150 million, the Marine Corps terminated the program.

The Marine Corps then began exploring the possibility of adapting Army systems to meet its fire support automation needs. The Corps is considering the AFATDS, Light TACFIRE, and FIST/DMD programs. It is also revising its fire support requirements, assessing trade-offs, and projecting the additional development efforts needed before the Army's systems can meet the Marine Corps' requirements. The Marine Corps will evaluate AFATDS, Light TACFIRE, and FIST/DMD from March through May 1989. The evaluation of AFATDS is to be in conjunction with the Army Concept Evaluation Test at Fort Sill, Oklahoma. The Marine Corps has not asked for funds to procure these systems.

In addition, the Office of the Secretary of Defense contracted with the Institute for Defense Analyses to review Marine Corps automated fire support requirements and assess the capability of existing and emerging systems to meet those requirements. The report, completed in December 1988, concluded that modifications of FIST/DMD, Light TACFIRE, and AFATDS can each, to varying degrees, meet Marine Corps fire support requirements.

APPENDIX III

GAO Congressional Direction

Chart III.1: Army Compliance with Congressional Direction

- The Army is buying Light TACFIRE in response to the Congress' instructions to meet the light divisions' needs.
- The Army paid Magnavox the maximum amount authorized under the congressional cost limit. However,
  - Contract modifications not subject to the spending cap have increased the contract price by $1 million and
  - Magnavox is negotiating a $9 million claim that could further increase the contract price.

In the fiscal year 1986 joint appropriations conference added $25.5 million to the Army's budget request. The purpose was to provide light divisions with a nondevelopmental automated field artillery command and control system. In March 1988, the Army complied with the appropriations conference language by purchasing Light TACFIRE for the light divisions. In fiscal year 1989, the Congress appropriated $13.2 million, which was not requested, to complete the buy for light divisions.

In an effort to control the governments' cost for AFATDS, the Congress, in December 1985, set a contract spending limit on the AFATDS CEP contract. The Army has not exceeded that ceiling, but has paid the contractor the maximum amount authorized under the spending cap. The contractor has submitted claims it contends are not subject to the ceiling.

The contract price has increased by $1 million due to contract modifications not considered subject to the ceiling. In May 1985, the contracting officer issued a stop work order on the Magnavox contract because of cost and schedule overruns, and directed Magnavox to take all reasonable steps to minimize allowable contract costs. After reducing the contract scope of work, in June 1985, the order was rescinded. Later, Magnavox agreed to accept about $351,000 as total reimbursement for the costs arising out of the stop work order.

In October 1985, the Magnavox contract was increased by $124,000 for the unlimited government rights to computer software and documentation. In July 1987, it was increased further by $500,000 to provide for contingency funding to cover termination costs, if necessary. According to the Army, the three contract modifications totaling nearly $1 million were not subject to the congressionally imposed ceiling and increased the contract price to $47.1 million.

In addition, in April 1987, Magnavox submitted a $9 million claim for costs it contends are not subject to the ceiling because they were incurred from a series of events for which the Army was responsible. The claim is being reviewed by the Army.

GAO Funding Needs

Chart IV.1: Fiscal Year 1989 Funding Needs

AFATDS Development:

- The Army requested $25.8 million for fiscal year 1989 AFATDS funding.
- DOD reduced the request to $17.7 million.
- The Congress further reduced it to $15.7 million.

AFATDS Procurement:

- The Army requested $78.7 million for fiscal year 1989 initial AFATDS production equipment.
- DOD reduced the request to $57.7 million.
- The Congress deleted the entire amount.

Forward Entry Device Procurement:

- The Army requested $17.8 million for fiscal year 1989 HTU funding.
- The Congress reduced HTU's funding by $13.2 million.

The Army requested $25.8 million for fiscal year 1989 AFATDS development. DOD reduced it to $17.7 million--$12.7 million for in-house program office support and $5 million to begin the next phase of AFATDS software development. According to Army officials, since the contract award for AFATDS' follow-on development phase has slipped to September 1989, the Congress only funded $12.7 million for program office support and $3 million to begin the next phase. The Army stated that the additional $2 million of 1989 funding is needed for the next phase to help minimize schedule risks, and is considering reprogramming to obtain these funds.

The Army also requested $78.7 million for fiscal year 1989 AFATDS procurement, which DOD reduced to $57.7 million. The request was based on the need to procure hardware to field block I software. However, a change in procurement plans and software development delays reduced the need for the funds. The Army will use $26 million from the AFATDS' fiscal year 1988 procurement budget to buy sufficient production hardware to transfer and test the AFATDS software. Since the AFATDS block I software development is not scheduled to be completed until April 1992 and the AFATDS hardware is scheduled to take 120 days from order to delivery, the need for additional AFATDS procurement funding in fiscal year 1989 was unnecessary. Consequently, the Congress deleted the $57.7 million. The Army agrees that procurement funding in fiscal year 1990 is not necessary.

The Army requested $17.8 million for fiscal year 1989 to procure an additional 540 HTUs. The Congress reduced the HTU funding by $13.2 million because the Army has delayed its procurement.

GAO Review Objectives

Chart V.1: Objectives, Scope, and Methodology

Objectives:

- Monitor and report on the status of
  - AFATDS,
  - Light TACFIRE,
  - FIST/DMD,
  - DCT/HTU,
  - Marine Corps' efforts,
  - Compliance with congressional direction, and
  - Fiscal year 1989 funding needs.

Scope and Methodology:

- Reviewed documents and interviewed officials from
  - the Office of the Secretary of Defense,
  - Army Headquarters,
  - Fort Monmouth, and
  - Contractor facilities.

The objectives of this review were to report on

-- the status of the AFATDS CEP,

-- the technical risk in transferring AFATDS software,

-- scheduled completion and fielding of AFATDS development phases,

-- the progress of the Light TACFIRE program,

-- the FIST/DMD schedule,

-- the Army's forward entry device programs,

-- the Marine Corps' plan for replacing the MIFASS program,

-- expenditures over the congressional cap, and

-- funding needs for fiscal year 1989 on AFATDS and forward entry device procurement.

To accomplish these objectives, we reviewed documents and interviewed DOD officials from the

-- Office of the Secretary of Defense and

-- AFATDS Program Office, Fort Monmouth, New Jersey.

We visited contractor facilities, reviewed documents, observed demonstrations, and interviewed officials. We also obtained documents and interviewed contractor personnel.

Our review was performed from November 1987 to December 1988 in accordance with generally accepted government auditing standards.

APPENDIX VI

RELATED GAO PRODUCTS

Fire Support System: Army's Plan to Improve Its Fire Support Capabilities (GAO/NSIAD-86-115BR, May 5, 1986).

Fire Support System: Status of the Fire Support Systems' Development (GAO/NSIAD-86-212FS, Sept. 15, 1986).

Fire Support System: Army's Plans to Improve Its Fire Support Capabilities (GAO/NSIAD-86-116BR, Sept. 19, 1986).

Battlefield Automation: Field Artillery Data Systems Acquisition Problems and Budget Impacts (GAO/NSIAD-87-198BR, July 31, 1987).

APPENDIX VII

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